## CLAIMS

1. An apparatus for increasing bandwidth in a frequency hopping transmission system, comprising:

a headend receiver responsible for active frequency management of an upstream transmission RF spectrum, wherein said headend receiver is capable of simultaneously receiving data from all possible upstream channels; and

one or more set-top boxes, each of said set top boxes being associated with a particular one of one or more nodes;

wherein communication between said headend receiver and said one or more set-top boxes proceeds via a parallel transmission model over said RF spectrum which comprises a plurality of communications channels.

2. The apparatus of Claim 1, wherein when said apparatus is first powered-up and optionally intermittently thereafter, said head-end receiver periodically examines said RF spectrum to determine which frequencies are available, and which are not available due to interference from other sources.

3. The apparatus of Claim 2, wherein said headend receiver polls said one or more nodes to determine how many of said one or more set-top boxes are active in each node after determining which frequencies are free of interference.

4. The apparatus of Claim 3, wherein said one or more set-top boxes are each assigned to a transmission channel by said headend receiver.

5. The apparatus of Claim 4, wherein said headend receiver partitions said one or more set-top boxes into an approximately equal number of set-top boxes for each of said available upstream data channels

6. The apparatus of Claim 4, wherein said head-end receiver commands each of said one or more set-top boxes to tune to a channel to which it has been assigned by sending channel selection information to each of said one or more set-top boxes.

7. The apparatus of Claim 6, wherein said headend receiver uses a separate downstream transmission channel to send channel selection information to each of said one or more set-top boxes.

8. The apparatus of Claim 4, wherein headend receiver further comprises:

an allocation table for keeping track of assignments of channels by storing a mapping between each channel and a set-top box to which said channel is assigned.

9. The apparatus of Claim 8, wherein said allocation table keeps track of areas which are deemed to be busy.

10. The apparatus of Claim 8, wherein said headend receiver finds those frequencies which are not available and eliminates them temporarily from said allocation table.

11. The apparatus of Claim 1, wherein said headend receiver further comprises:

a slotted assignment system which assigns each of said one or more set-tops boxes a specific transmission slot, wherein each slot comprises a specific slice of time used to transmit information.

12. The apparatus of Claim 11, said slotted assignment system further comprising:

a guard band such that a worst case clock skew between different transmitters does not result in overlap from slot to slot.

13. The apparatus of Claim 11, said slotted assignment system further comprising:

a timestamp that is broadcast downstream to each of said one or more set-top boxes at a regular interval.

14. The apparatus of Claim 13, wherein said timestamp is repeated at regular intervals so that inherent timing inaccuracy of individual set-top boxes is not given an opportunity to become significant because each of said one or more set-top boxes resets a slot timer when it receives a broadcast time-stamp.

15. The apparatus of Claim 13, wherein said headend receiver requests that each of said one or more set-top boxes echos a specific command as rapidly as

possible periodically, while polling each of said one or more nodes for attached set-top boxes.

16. The apparatus of Claim 15, wherein said headend receiver further comprises:

a mechanism that begins running an internal timer at the instant said head-end receiver sends out said command to a particular one of said one or more set-top boxes;

wherein said timer is incremented until a response is received from said particular one of said one or more set-top boxes;

wherein said response is an echo of said timestamp;

wherein a value of said timer is an accurate measure of propagation delay plus processing delay in said particular one of said one or more set-top boxes once a response has been received by said headend receiver; and

wherein a value is generated for each of said one or more set-top boxes to align timing for said one or more set-top boxes.

17. The apparatus of Claim 16, wherein said headend receiver repeatedly operates said mechanism several times and averages time correction results obtained thereby.

18. The apparatus of Claim 16, wherein said head-end receiver transmits a particular time correction factor it computed while polling said one or more set-top boxes back to a corresponding one of said one or more set-top boxes;

wherein said corresponding one or said one or more set-top boxes subtracts said timing correction factor from a nominal slot time to determine a corrected slot time; and

wherein a transmission packet is aligned properly to a desired slot transmission point by the time said particular one or said one or more set-top boxes actually begins transmission.

19. The apparatus of Claim 12, said slotted assignment system further comprising:

a mechanism that enables interrupts to occur at a desired slot frequency.

20. The apparatus of Claim 19, said mechanism comprising:

a timer interrupt programmed to awaken a CPU at each set-top box at a nearest hardware interrupt point preceding a desired slot interval; and

a counter for counting down a remaining time until said set-top box's transmission slot is reached;

wherein said slots are subdivided into sub-slots that are finer than the timing resolution of said set-top box.

21. A method for increasing bandwidth in a frequency hopping transmission system, comprising the steps of:

providing a headend receiver responsible for active frequency management of an upstream transmission RF spectrum, wherein said headend receiver is capable of simultaneously receiving data from all possible upstream channels; and

providing one or more set-top boxes, each of said set top boxes associated with a particular one of one or more nodes;

wherein communication between said headend receiver and said one or more set-top boxes proceeds via a parallel transmission model over said RF spectrum which comprises a plurality of communications channels.

22. The method of Claim 21, further comprising the step of:

said head-end receiver examining said RF spectrum to determine which frequencies are available, and which are not available due to interference from other sources.

23. The method of Claim 22, further comprising the step of:

said headend receiver polling said one or more nodes to determine how many of said one or more set-top boxes are active in each node after determining which frequencies are free of interference.

24. The method of Claim 23, further comprising the step of:

said headend receiver assigning each of said one or more set-top boxes to a transmission channel.

25. The method of Claim 24, further comprising the step of:

said headend receiver partitioning said one or more set-top boxes into an approximately equal number of set-top boxes for each of said available upstream data channels

26. The method of Claim 24, further comprising the step of:

said head-end receiver commanding each of said one or more set-top boxes to tune to a channel to which it has been assigned by sending channel selection information to each of said one or more set-top boxes.

27. The method of Claim 26, further comprising the step of:

said headend receiver using a separate downstream transmission channel to send channel selection information to each of said one or more set-top boxes.

28. The method of Claim 24, further comprising the step of:

keeping track of assignments of channels by storing a mapping between each channel and a set-top box to which said channel is assigned in an allocation table associated with said headend receiver.

29. The method of Claim 28, further comprising the step of:

said allocation table keeping track of areas which are deemed to be busy.

30. The method of Claim 28, further comprising the step of:

said headend receiver finding those frequencies which are not available and eliminates them from said allocation table.

31. The method of Claim 21, further comprising the step of:

assigning each of said one or more set-tops boxes a specific transmission slot with a slotted assignment system associated with said headend receiver, wherein each slot comprises a specific slice of time used to transmit information.

32. The method of Claim 31, further comprising the step of:

said slotted assignment system providing a guard band such that a worst case clock skew between different transmitters does not result in overlap from slot to slot.

33. The method of Claim 31, further comprising the step of:

said slotted assignment system providing a timestamp that is broadcast downstream to each of said one or more set-top boxes at a regular interval.

34. The method of Claim 32, further comprising the step of:

repeating said timestamp at regular intervals so that inherent timing inaccuracy of individual set-top boxes is not given an opportunity to become significant because each of said one or more set-top boxes resets a slot timer when it receives a broadcast time-stamp.

35. The method of Claim 33, further comprising the step of:

said headend receiver requesting that each of said one or more set-top boxes echo a specific command as rapidly as possible during system initialization, while polling each of said one or more nodes for attached set-top boxes.

36. The method of Claim 35, further comprising the steps of:

providing a mechanism running an internal timer in said headend receiver at the instant said head-end receiver sends out said command to a particular one of said one or more set-top boxes;

incrementing said timer is until a response is received from said particular one of said one or more set-top boxes;

wherein said response is an echo of said timestamp;

wherein a value of said timer is an accurate measure of propagation delay plus processing delay in said particular one of said one or more set-top boxes once a response has been received by said headend receiver; and

wherein a value is generated for each of said one or more set-top boxes to align timing for said one or more set-top boxes.

37. The method of Claim 36, further comprising the step of:

said headend receiver repeatedly operating said mechanism several times and averaging time correction results obtained thereby.

38. The method of Claim 36, further comprising the step of:

said head-end receiver transmiting a particular time correction factor it computed while polling said one or more set-top boxes back to a corresponding one of said one or more set-top boxes;

wherein said corresponding one or said one or more set-top boxes subtracts said timing correction factor from a nominal slot time to determine a corrected slot time; and

wherein a transmission packet is aligned properly to a desired slot transmission point by the time said particular one or said one or more set-top boxes actually begins transmission.

39. The method of Claim 32, said slotted assignment system further comprising:

a mechanism that enables interrupts to occur at a desired slot frequency.

40. The method of Claim 39, further comprising the steps of:

providing a timer interrupt programmed to awaken a CPU at each set-top box at a nearest hardware interrupt point preceding a desired slot interval; and

providing a counter for counting down a remaining time until said set-top box's transmission slot is reached;

wherein said slots are subdivided into sub-slots that are finer that the resolution of said set-top box.

41. A method for increasing bandwidth in a frequency hopping transmission system comprising one or more set-top boxes, each of said set top boxes associated with a particular one of one or more nodes, said method comprising the steps of:

providing a headend receiver responsible for active frequency management of an upstream transmission RF spectrum, wherein said headend receiver is capable of simultaneously receiving data from all possible upstream channels;

wherein communication between said headend receiver and said one or more set-top boxes proceeds via a parallel transmission model over said RF spectrum which comprises a plurality of communications channels.

42. A method for increasing bandwidth in a frequency hopping transmission system comprising one or more set-top boxes, each of said set top boxes associated with a particular one of one or more nodes, said method comprising the steps of:

assigning each of said one or more set-tops boxes a specific transmission slot with a slotted assignment system associated with a headend receiver, wherein each slot comprises a specific slice of time used to transmit information;

providing a timer interrupt programmed to awaken a CPU at each set-top box at a nearest hardware interrupt point preceding a desired slot interval; and

providing a counter for counting down a remaining time until said set-top box's transmission slot is reached;

wherein said slots are subdivided into sub-slots that are finer that the resolution of said set-top box.

43. A method for increasing bandwidth in a frequency hopping transmission system comprising one or more set-top boxes, each of said set top boxes associated with a particular one of one or more nodes, said method comprising the steps of:

assigning each of said one or more set-top boxes to a transmission channel with a headend receiver; and

keeping track of assignments of channels by storing a mapping between each channel and a set-top box to which said channel is assigned in an allocation table associated with said headend receiver.

44. An apparatus for increasing bandwidth in a frequency hopping transmission system comprising one or more set-top boxes, each of said set top boxes associated with a particular one of one or more nodes, said apparatus comprising:

a headend receiver responsible for active frequency management of an upstream transmission RF spectrum;

wherein said headend receiver further comprises:

a mechanism for simultaneously receiving data from all possible upstream channels; and

a parallel transmission model, wherein communication between said headend receiver and said one or more set-top boxes proceeds over said RF spectrum which comprises a plurality of communications channels.

45. An apparatus for increasing bandwidth in a frequency hopping transmission system comprising one or more set-top boxes, each of said set top boxes associated with a particular one of one or more nodes, said apparatus comprising:

means for assigning each of said one or more set-tops boxes a specific transmission slot with a slotted assignment system associated with a headend

receiver, wherein each slot comprises a specific slice of time used to transmit information;

a timer interrupt programmed to awaken a CPU at each set-top box at a nearest hardware interrupt point preceding a desired slot interval; and

a counter for counting down a remaining time until said set-top box's transmission slot is reached;

wherein said slots are subdivided into sub-slots that are finer that a resolution of said set-top box.

46. An apparatus for increasing bandwidth in a frequency hopping transmission system comprising one or more set-top boxes, each of said set top boxes associated with a particular one of one or more nodes, said apparatus comprising:

means for assigning each of said one or more set-top boxes to a transmission channel with a headend receiver; and

an allocation table associated with said headend receiver for keeping track of assignments of channels by storing a mapping between each channel and a set-top box to which said channel is assigned.